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Exploring L2 structural convergence in peer task-based interaction

Abstract

This study explored the occurrence and characteristics of structural convergence, defined as speakers' propensity to reuse an underlying syntactic structure to which they have been exposed in recent discourse, and its link to production accuracy in L2 unscripted task-based interactions. Twenty-two English university learners (eleven dyads) with diverse language backgrounds completed two versions of a problem-solving discussion task in two separate sessions. Their video-recorded interactions were transcribed and coded for structural convergence (structure types and accuracy). The results showed that participants demonstrated structural convergence in unscripted L2 task-based interactions. They also converged on different structures to varying degrees across the two interaction sessions. In addition, the results also showed an association between structural convergence and production accuracy, with participants producing more correct and incorrect targets when exposed to correct and incorrect primes respectively. These results are discussed in terms of impact of the nature of task interaction on occurrence and characteristics of structural convergence, and the role of structural convergence in L2 production accuracy.

Key words: Structural convergence, problem-solving discussion tasks, task-based interaction, production accuracy.

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Introduction

Previous second language (L2) interaction research has shown positive impacts of spoken interaction on L2 production accuracy and development (Mackey, 1999; 2012; Mackey & Goo, 2007). These positive impacts are often ascribed to different interaction features such as comprehensible input, pushed output, feedback, and discussion of language forms such as language related episodes or LREs (Dao & McDonough, 2017; Mackey & Gass, 2006; McDonough, 2005; Swain, 2005; Swain & Lapkin, 2002). However, L2 interaction research has also shown that these positive impacts are mediated by a host of variables such as task characteristics and implementation conditions (See Philp, Adams, Iwashita, 2014 for a review). Situated within this line of research, the current study investigated an under-researched aspect of L2 interaction, structural convergence, to obtain a better understanding of whether structural convergence occurs in learner-learner interaction (peer interaction), and whether it is affected by task characteristics, as well as its link to L2 production accuracy.

Structural convergence in second language interaction

Structural convergence, often known as syntactic priming, refers to speakers' propensity to reuse an underlying syntactic structure to which they have been exposed in recent discourse (Bock, 1986). In this study, the term *structural convergence* is used to reflect the unscripted nature of the interaction generated by an interactive task that does not include intentional primes of target structures. Excerpt 1 below from Dao, Trofimovich and Kennedy (2018) presents a talk segment in which structural convergence occurs in peer L2 task-based interaction. In this excerpt, two L2 learners describe and discuss pictures in order to create a story. The abstract structural frame on which the L2 learners converge is a relative clause (a noun + relative pronoun + verb + object).

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Excerpt 1. An example of structural convergence

1A: ...uh *the guy who wants to steal the money*

2B: Ok I think the first one is *the man who... wear... wear glasses*

(Dao, Trofimovich, Kennedy, 2018, p.13)

As can be seen in Excerpt 1, after the learner 1A produced an utterance that contained a relative clause, the learner 2B adopted the structure and reused it – albeit not entirely accurately - when describing another picture. Learner 2B’s reusing of the relative clause instead of other potential alternatives such as a participle construction (e.g., the first one is *the man wearing glasses*) was characterized by Dao et al. (2018) as structural convergence. This example illustrates that learners may repeat each other’s language patterns or converge on structures in their language use during peer interaction.

Recently, there has been a growing interest in L2 interaction research examining the relationship between interaction and L2 production accuracy from the perspective of structural convergence (See Trofimovich & Kennedy, 2014; Collentine & Collentine, 2013; McDonough, 2011; McDonough & Mackey, 2008; Michel & Smith, 2017; Shin & Christianson, 2012; Trofimovich, McDonough & Neumann, 2013). This line of research generally attempts to understand how learners’ tendency to reproduce a grammatical structure that is present in a preceding utterance promotes production accuracy and possibly contributes to L2 development. Theoretically speaking, because a speaker is sensitive to repeated exposure to syntactic structures during interaction, when processing language output he or she is likely to activate his/her mental representations of the syntactic structure or rules associated with that structure. This syntactic activation is claimed to persist without decaying swiftly (Bock, 1986; Branigan, Pickering & Cleland, 2010; Pickering & Ferreira, 2008) and enhances the probability that a

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speaker reproduces this structure, which has the potential to have a positive impact on language production accuracy and development.

Previous L2 research has found that structural convergence affected L2 production. When investigating learners' production of *Wh*- questions in response to scripted primes, McDonough and Mackey (2008) found that learners who demonstrated a high level of structural priming were likely to produce more advanced level *Wh*-questions in question developmental sequences (Pienemann, Johnston, & Brindley, 1988; Pienemann & Johnston, 1987). In addition, learners were likely to generate more accurate *Wh*-questions when primes and prompts of priming tasks contained a wide range of lexical verbs (McDonough & Kim, 2009). Collentine and Collentine (2013) posited that structural convergence can be viewed as a communication strategy, especially for lower proficiency learners, because it could help learners use fewer attentional resources and therefore reduce online processing demands during interaction (Garrod & Clark, 1993; Pickering & Garrod, 2004). In sum, this research suggests that structural convergence enhances learners' language production accuracy.

However, most of this research has investigated structural convergence in L2 interactions that were partially scripted using what is known as a confederate interlocutor (see McDonough & Mackey, 2008). In such research, to create a priming condition, the structure of interaction is manipulated skilfully with the confederate interlocutor purposefully producing primes of target structures with the intention of eliciting structural convergence. During interaction, the confederate interlocutor often tries to provide scripted primes first in order to elicit the reproduction of these structures from the learner partner. The structures in the primes have been also pre-determined and the convergence has been examined in relation to these structures only.

Apart from using a confederate interlocutor to elicit structural convergence, recent research has attempted to manipulate task materials by including primes of target structures and

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prompts of developmentally challenging structures in order to enhance the occurrence of structural convergence. In these studies, the task materials were seeded with grammatically accurate sentence primes of target structures (e.g., utterances that contain a target structure). The learners who were exposed to these primes and were given prompts, which were often a phrase or a head noun, were expected to produce the target structures. For instance, in a communicative task from McDonough and De Veleeschauwer (2012) two speakers take turns asking each other questions about the task pictures, primes and prompts that are provided in the task materials. The structure prime in this task is a *Wh*-question structure which is purposely produced by the confederate interlocutor and the prompt is a head noun and a verb (e.g., *Joy/teach*) given to the learner speaker. The purpose of including a prime and a prompt in the task materials is to elicit convergence on the *Wh*-question structure, as shown in the Excerpt 2 below.

Excerpt 2

Researcher: *who did they see in the tree?* (prime question)

Learner: *three small bird*

Researcher: *oh okay, this one right?*

Learner: *yeah who did Joy teach?* (prompt = *Joy/teach*)

Researcher: *a boy and his sister.*

(McDonough & De Veleeschauwer, 2012, p.355)

In recent research, the sequence of turn-taking during interaction was also explained explicitly to learners prior to their interaction in order to create a condition for structural convergence to occur (see McDonough, 2011; McDonough et al., 2015). In this sense, the researchers manipulated the interactions and task materials purposely in order to elicit and enhance the occurrence of structural convergence for certain structures. In addition, structures embedded in

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these task primes were often developmentally complex and focused on one or two grammatical features.

Therefore, this previous research has investigated only scripted interactions with developmentally challenging structures without considering other structures that are used spontaneously by L2 learners during unscripted task-based interaction. During spontaneous L2 task-based interactions, learners may use varied structures to serve their conversational purposes. Thus, it is desirable to expand research on structural convergence to include the investigation of structures that occur spontaneously in unscripted L2 task-based interaction. Costa, Pickering and Sorace (2008) argued that during the course of interaction L2 learners may converge on any structure in order to achieve mutual understanding. This poses the question of which structures L2 speakers converge on and whether structural convergence is linked to production accuracy. In addition, since priming tasks were manipulated purposefully in previous research, little is known about whether production of structures in structural convergence during unscripted L2 task-based interactions is affected by the characteristics of the communicative tasks used to elicit the interaction.

Task features and L2 structural convergence

As explained, postulating that structural convergence is useful for consolidating linguistic knowledge and language development, L2 researchers have created and manipulated communicative priming tasks in order to elicit target structures and therefore help L2 learners to develop automatic use of these not-fully-acquired structures. It was generally found that priming tasks or activities were effective at eliciting target structures.

Task features have been shown to influence the effects of priming. For instance, tasks with a repetition of lexical items between primes and prompts – a so-called lexical boost feature in

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prime-prompt design – encouraged learners to produce more *Wh*-questions compared to those without a lexical boost. However, long-term effects on L2 *Wh*-question development were greater with a variety, rather than a restricted set, of lexical verbs in primes and prompts (McDonough, 2011). Another example is that when investigating the effects of tasks designed with and without primes on the production of target structures such as relative clauses, adverbial clauses, and passives, McDonough, Trofimovich and Neuman (2015) found that, although tasks with primes elicited more production of relative clauses and adverbial clauses than those without primes, this was not the case for passives. They suggested considering the target structures carefully when designing priming tasks. Moreover, when priming tasks were less interactive or not interactive, such as a summary task, they tended to constrain the occurrence of structural priming (McDonough, 2014).

In contrast to tasks used in McDonough and colleagues' priming research, tasks employed by Collentine and Collentine (2013) did not include intentional prompts and primes of the target structure, nominal clauses. Primes of nominal clauses were naturally produced by interlocutors during the course of synchronous computer-mediated interaction. In addition, although native speakers were involved in the interaction, they were not confederate interlocutors who produced primes purposefully. Instead, primes and targets were produced spontaneously by both native speakers and L2 learners during their interaction. The results revealed that learners produced significantly more target structures when a previous utterance contained a target structure than when it did not. The results also showed that under similar interactional conditions, the L2 learners were more likely to converge on the target structure than the native speakers, when a prime was present in the previous utterance. Collentine and Collentine attributed the difference between L2 learners and native speakers to differences in proficiency

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levels, and suggested that the L2 tend to display more structural convergence due to having lower proficiency levels.

Overall, the findings above suggest that varying the features of communicative language tasks and priming tasks might either limit or enhance the production of target structures and degree of structural convergence. Thus, research into specific task types, such as problem-solving discussion tasks, one kind of popular task in L2 classrooms, is warranted to examine the impact of task features on structural convergence.

The current study

As explained above, to promote the occurrence of convergence on certain structures and through this to facilitate the production accuracy of converged structures, researchers have often created partially scripted interactions by involving a confederate interlocutor who provided primes of the target structures or manipulated the communicative tasks by providing learners with primes and prompts of the structures in task materials (Kim & McDonough, 2008; McDonough, 2006, McDonough, Trofimovich & Neumann, 2015; Shin & Christianson, 2009). However, it has been suggested that structural convergence could possibly occur in any communicative task (Costa et al., 2008; Dao, Trofimovich & Kennedy, 2018). In addition, in L2 classrooms teachers may use a wide range of communicative tasks, but not necessarily priming tasks. Thus, an interesting question is whether structural convergence occurs in unscripted interactions generated by communicative tasks that are not purposely seeded with primes and prompts. Furthermore, when no primes are intentionally provided in task materials, little is known about which structures the learners converge on during unscripted task-based interaction. Priming tasks generally target highly complex and challenging structures; however, what remains unknown is whether learners converge on both complex and simple structures. Previous research also demonstrated that the degree of structural convergence in scripted task-based

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interaction affected production accuracy. Thus, another important question is whether the learners reproduce structures more accurately after being exposed to primes produced by their interlocutors. To address these gaps in the literature, the current exploratory study investigates whether structural occurrence occurs in L2 unscripted task-based interactions, which structures are involved in structural convergence, and whether it is linked to production accuracy. Three research questions are formulated as below.

1. Does structural convergence occur in unscripted L2 task-based interactions?
2. If so, which structures do learners converge on during interaction?
3. Is structural convergence linked to production accuracy?

Methods

Participants

Participants were twenty-two first-year international learners (11 dyads) at an English-medium university in Montreal, Canada. Their ages ranged from 22 to 34 ($M=25.9$, $SD=3.11$) with diverse first languages. Their average reported length of residence in Montreal was 6.43 months ($SD=10.76$). The learners were enrolled in various undergraduate and graduate degree programs. They self-rated their English proficiency on a nine-point Likert scale (1 = *very poor* and 9 = *very fluent*). The grand mean of all self-ratings for proficiency was 6.2 ($SD=1.3$), with a specific mean of 5.8 ($SD=1.3$) and 6.5 ($SD=1.4$) for speaking and listening, respectively. This could mean that the participants were reasonably fluent speakers of English.

Although the participants were university learners at an English-medium university, their English proficiency varied due to different English proficiency requirements for entry into different programs. To provide more information about the proficiency pairing of randomly created dyads in this study, three experienced English teacher raters were asked to watch all video-recorded interactions and judge independently whether learners in each dyad were of

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similar or asymmetric proficiency levels using a holistic rubric –ALTE Cambridge Five-Level system rating rubric (See Jones, 2000 for description of the rubric). Asymmetric proficiency dyads were defined as those that contained one lower proficiency speaker (e.g., Level 3-ALTE scale) and one higher proficiency speaker (e.g., Level 5-scale), whereas similar proficiency dyads included two speakers of similar or the same proficiency based on the ALTE five-level scale. Although the raters had experience using this rubric before, they had a short online meeting with the first author to discuss the rubric and did a rating trial of a video. After rating independently, the three raters compared the rating results, and resolved disagreement (17.4%) through discussion. The results showed that there were fourteen asymmetric proficiency dyads and eight similar proficiency dyads, meaning that nearly 64% of dyads in this study were asymmetric or mixed proficiency dyads.

Materials and procedure

The study used a problem-solving discussion task that asked the participants to discuss and negotiate to reach consensus on solutions to a problem based on a topic prompt. Four topic prompts related to academic contexts were used: scholarship and obligations, university dropout rates, grading fairness, and learners' unequal opportunities (see Appendix 1). Participants were paired randomly according to their availability for data collection. They carried out the task twice in two separate sessions, with the first session at the beginning of their semester and the second session at the end of the semester. Each time they met, they interacted with a different partner with whom they had not been previously paired. They also were assigned a different task topic prompt in each session. The participants sat in a quiet room at a table across from each other and wore lapel microphones. Their interactions were video-recorded. Before carrying out the task, they were asked to introduce themselves and chat in order to get to know each other. They

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also completed a background information questionnaire and proficiency self-rating form. They were required to carry out the discussion task within seven minutes.

Coding of structural convergence

Twenty-two seven-minute video-recordings (177.26 minutes in total) from two sessions were transcribed verbatim and verified by two non-native advanced-proficiency speakers of English who were both Applied Linguistics PhD candidates. The interactions were coded for evidence of structural convergence. Following Pickering and Garrod's (2004) interactive convergence account, structural convergence was operationalized as a talk segment where one speaker produced an utterance containing a structure (a prime) and the speaker's partner reuses that structure in utterance (a target) within a six-adjacent turn span. The span of six consecutive turns was used following the suggestion of previous research (Dao, Trofimovich & Kennedy, 2018; also see Collentine & Collentine, 2013) and was deemed to be comparable to the time lag manipulated in previous structural priming research (Bock & Griffin, 2000). In addition, the operationalization of structural convergence was limited to between-speaker structural convergence in interaction. Therefore, within-speaker structural convergence was excluded.

Based on Goldberg's (2006) definition of a construction as a pairing of form and function, to be counted as a structure a construction needs to have an abstract structural frame that is not predictable from its components. Utterances of a converged structure were considered as primes when that structure was absent in the previous utterance within a six-adjacent turn span. Meanwhile, utterances were considered as targets when the previous utterance had that structure within the six-adjacent turn span. When an utterance was counted as a target, it was not considered as a prime for a possible subsequent target.

Excerpt 3 illustrates how a structure frame, a prime and a target were identified. In this excerpt, the converged structure is an existential '*There*' construction with its abstract frame being '*There*

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+ *be* + *a noun phrase*'. Learner B produced an utterance with an existential *There* structure (a prime), and learner A reused this structure immediately in a subsequent turn (a target).

Excerpt 3

SB: ...***there is an entrance exam*** for getting into the university, so only talented learners can get their way to the post secondary education or... (*prime, +accuracy*)

SA: ...university degrees yeah ***there is one universal exam*** around the country... (*target, +accuracy*)

For the coding of accuracy of production, following formal English grammar rules, both the prime and target in Excerpt 3 were coded as a correct prime and a correct target.

In Excerpt 4 below, the converged structure is '*to + infinitive*' construction, with the abstract frame being '*Subject + verb + to + infinitive*'. In this excerpt, the prime was coded as correct, followed by an incorrect target because the verb *tell* is used in the *bare infinitive* form instead of *to-infinitive* form after the verb *need*.

Excerpt 4

SA: and ***you don't need to sign anything***... (*prime, +accuracy*)

SB: yeah any... ***you don't need uh tell anything*** yeah you just agree(*target, -accuracy*)

Data analysis

To address the first research question that asked whether structural convergence occurred in task-based interactions, instances of prime-target and prime-no-target per interaction were identified. A prime-target instance indicated learners' reproduction of an abstract structure frame that was used in a previous utterance (see Excerpts 3 and 4), whereas a prime-no-target reflected an instance of talk where an abstract structure frame was produced but was not reused in a subsequent turn within a six-adjacent-turn time lag. After instances of prime-target and prime-

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no-target were identified, sums for each type (prime-target and prime-no-target) were calculated per interaction. To control for the difference in the amount of talk (Smith, 2003), two proportion scores for prime-target and prime-no-target per interaction were computed. Prime-target proportion scores were obtained by dividing the sum of prime-target instances by the total number of utterances that contained the converged structures in each interaction. Meanwhile, prime-no-target proportion scores were computed by dividing the sum of prime-no-target instances by the total number of utterances that had the converged structure. Following previous research (Dao, Trofimovich & Kennedy, 2018), structural convergence was established when the prime-target proportion score was greater than prime-no-target proportion score.

To answer the second question that examines which structures learners converged on during interaction, abstract structure frames were identified in instances of structural convergence and were qualitatively described. To investigate the third research question, the link between structural convergence and production accuracy, instances of structural convergence were classified into four categories: correct prime → correct target, correct prime → incorrect target, incorrect prime → correct target, and incorrect prime → incorrect target. Proportion scores for all categories were calculated and compared. For the inter-rater reliability, a second coder coded 25% of the data for structural convergence and production accuracy. The results showed high agreement among coders for structural convergence (95.02%) and production accuracy of the converged structures (92.20%).

Results

Structural convergence in L2 interaction

To determine the occurrence of structural convergence, instances of prime-target and prime-no-target in each interaction were identified. The proportion scores for prime-target and prime-no-target instances are presented in Table 1. As shown in Table 1, there were more instances of

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prime-target than prime-no-target in both interaction sessions. The paired-samples *t*-tests showed that significant differences were observed for both sessions. These results indicate that learners converged on grammatical structures in unscripted L2 task-based interactions.

Table 1

Proportion scores of prime-no-target and prime-target instances per interaction

Session	Prime-target				Prime-no-target						
	Dyads	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>	<i>d</i>
First	11	25.90	.58	.86	18.63	.41	.08	3.31	10	.008	1.78
Second	11	25.72	.59	.87	17.63	.40	.07	3.72	10	.004	2.73

Note: *n* = raw number, *M* = Mean, and *SD* = Standard Deviation

Abstract structural frames in L2 structural convergence

The results show that learners converged on a variety of structures. Table 2 shows that the infinitive structure, *That*-complement, relative clauses and adverbial clauses were the most frequent converged on structures in the current dataset (see Appendix for primes and targets). Table 2 also indicates that learners converged on structures to varying degrees, with some structures (e.g., existential *There*, result clause – so that, *what* –clause, make +noun+ adjective construction) having low levels of convergence.

Table 2

Structural convergence per construction across all interactions

Construction	Prime-target			Prime-no-target		Example
	Sum	<i>n</i>	%	<i>n</i>	%	
Infinitive structure	182	103	57.76	79	42.24	Maybe <i>it's better to make some new opportunities for the persons</i> who uh study abroad.... maybe better salary...
<i>That</i> -complement	153	91	59.48	62	47.83	Ok <i>but I wonder this is a good solution?</i>

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Relative clauses	64	40	62.5	24	37.5	...to serve in British Petroleum for double <i>period that you spend out...</i>
Adverbial clauses	66	32	48.48	34	51.52	...so, <i>if they decide to more opportunity, they have also to return something to the, to the government</i> that pay for their ...
Superlative	27	16	59.26	11	40.74	...it's not bad but uh maybe <i>it's not the best uh solution</i>
Passive voice	21	8	38.1	13	61.9	...so we are agree on three points that more supervision <i>must be given to the learners...</i>
What-clause	17	8	47.06	9	52.94	like we have to advice them on ...uh <i>what courses uh are really interesting them uh – really interest them...</i>
Existential <i>There</i>	9	6	66.67	3	33.33	... <i>there is an entrance exam</i> for getting into the university...
Make + noun + adjective	6	3	50.00	3	50.00	...we didn't if we makes if we <i>make the courses easier...</i>
Result clause: So that	5	2	40.00	3	60.00	and uh <i>give them a scholarship so that they can pay one year at maximum</i> and they can ask scholarship from uh as graduate learner

Production accuracy

To examine whether structural convergence is associated with production accuracy, scores for grammaticality of primes and targets in prime-target instances were calculated. These are presented in Table 3. The results show that when a learner produced a correct prime, his partner was more likely to produce a correct target ($M = .79$, $SD = .11$) rather than an incorrect target ($M = .10$, $SD = .07$). Similarly, production of incorrect primes was more likely to result in more incorrect targets ($M = .07$, $SD = .05$) than correct targets ($M = .04$, $SD = .03$). However, the results also showed that learners could sometimes produce correct targets followed by incorrect primes. Noticeably, the learners in this study produced a large proportion of correct primes (79%) followed by correct targets (correct prime→correct target) as compared with other categories.

Table 3

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Accuracy of primes and targets (proportion scores) in structural convergence per interaction

Prime→Target	<i>M</i>	<i>SD</i>
Correct/correct	.79	.11
Correct/incorrect	.10	.07
Incorrect/correct	.04	.03
Incorrect/incorrect	.07	.05

Note: *M* = *Mean*, and *SD* = *Standard Deviation*

In summary, the learners demonstrated structural convergence in unscripted L2 task-based interactions generated by a problem-solving discussion task. They converged on different structures; however, the degree of structural convergence varied across structures, with some structures having a low degree of convergence. In addition, they produced more correct targets preceded by correct primes. There were also cases where learners produced correct targets preceded by incorrect primes.

Discussion

The current study investigated structural convergence in L2 unscripted task-based interaction with regard to its occurrence, structure types and production accuracy. The results have provided evidence that the learners converged on structures in unscripted task-based interaction generated by tasks that were not seeded with primes and prompts of any target structures. These results confirm previous research findings on structural convergence in L2 task-based interaction (Collentine & Collentine, 2013; Dao, Trofimovich & Kennedy, 2018; McDonough, in press; McDonough & Chaikitmongkol, 2011, McDonough, Trofimovich & Neuman, 2015; Trofimovich, McDonough & Neumann, 2013).

The results also show that the degree of structural convergence was varied and that it was particularly low for some structures (e.g., result clause *so that*, existential *there*). The low degree

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of convergence is in line with Collentine and Collentine's (2013) findings that when primes of these target structures were not intentionally incorporated into the task materials, learners less frequently converged on these structures. Both the present study and Collentine and Collentine (2013) did not purposely add primes and prompts to task materials. The primes for structural convergence in these two studies were spontaneously generated by speakers. Therefore, it appears that the use of tasks designed without purposeful primes of target structures may have affected the degree of structural convergence. This could suggest that to not only elicit but also enhance structural convergence of certain types of structures, primes of target structures and prompts need to be incorporated into task materials (see Excerpt 2). However, the characteristics of target structures need to be taken into consideration when embedding primes in tasks, because some structures such as passives may not be affected by intentional primes (McDonough, Trofimovich & Neumann, 2015).

Moreover, the low degree of structural convergence of some structures could be attributed to the nature of the task. Tasks in previous priming research regulated turn-taking procedure strictly (McDonough; 2011, McDonough & Chaikitmongkol, 2010). For instance, in a trivia task used in McDonough (2014) learners were instructed to take turns to produce a prime and then complete a prompt. This expected sequence of turn taking was explained explicitly to the learners before they carried out the task. The purpose of this manipulation was to enhance the possibility of structural priming. Despite sharing similar characteristics with priming tasks used in previous research (e.g., collaborative, meaning-focused, two-way information), the task used in the current study did not require a specific turn-taking pattern. In addition, compared to the trivia priming task, which allocated equal information for required exchange to each speaker in dyads, a problem-solving discussion task used in the current study did not control the allocation of task information to speakers. Thus, some learners might have dominated the discussion,

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especially in mixed proficiency dyads, by producing more language or refuting partner's ideas and producing long turns (Dao & McDonough, 2017; Yule & MacDonald, 1990). Producing long turns would probably prevent learners from 'picking up' structures present in preceding utterances, consequently leading to less structural convergence (McDonough, 2014). Thus, it seems that the nature of the problem-solving discussion task might have impacted the degree of the structural convergence.

With regard to structures used in instances of structural convergence, learners converged on a variety of structures, because they were free to use any structures in order to carry out their discussion. The convergence on a variety of structures supports Nakaham, Tyler and van Lier's (2001) finding that a relatively unstructured task encouraged learners to use a wider variety of structures in their spoken language production.

Another main finding was that structural convergence affected production accuracy. When hearing a correct prime, the learners were more likely to produce a correct target. However, when incorrect primes were produced, the learners converged even on these inaccurate structures. Thus, to encourage the positive impact of structural convergence on production, the purposive incorporation of accurate primes into task materials, as explained in Excerpt 2 above, is essential because these primes may serve as accurate utterance models of structures for L2 learners in language production. Otherwise, L2 learners may be more likely to converge on inaccurate structures (Costa et al., 2008).

The results also showed that there were cases in which the learners provided accurate targets despite hearing inaccurate primes. This finding could be related to the proficiency factor. In mixed proficiency dyads, which accounted for the majority of dyads in this study (64%), higher proficiency learners could likely produce accurate targets even though their lower proficiency partners had produced inaccurate primes. Pairing learners of different proficiency

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levels could affect the levels of production accuracy of structural convergence. Since the proficiency factor was not directly investigated in this study, this interpretation remains speculative and needs to be confirmed in future research.

The results have some classroom implications. First, problem solving discussion tasks appear to be suitable for eliciting convergence on different structures and through this facilitating the production accuracy of the converged structures. Second, because structures that learners converged on were varied, to facilitate the occurrence and production accuracy of certain structures, it is important to include intentional primes (e.g., sample sentences of target structure) of these structures and response prompts (e.g., head noun and verb) in task materials as suggested in previous research (McDonough, 2011; McDonough & Chaikitmongkol, 2010).

Conclusion

This study examined whether structural convergence occurred in unscripted L2 task-based interaction, its structural characteristics and its relationship with production accuracy. The results showed that L2 learners demonstrated convergence on structures in interactions generated by problem-solving discussion tasks that did not include pre-determined primes of target structure or prompts. In addition, the learners converged on a variety of structures that emerged during their interaction. The study also provided some evidence for the positive impact of structural convergence on L2 production accuracy. It is suggested that the lack of seeded primes and prompts had an impact on the degree of structural convergence and the structures that were converged on. It may also be that the relative proficiency of the speakers in the dyads affected production accuracy in structural convergence. The study has limitations that need to be kept in mind when interpreting the results. First, only one task type was used; therefore, the comparison of different task types in future research could provide further insights into how the nature of

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tasks affects structural convergence. Second, the analyses of the structural features of convergence and production accuracy remained relatively descriptive due to the small sample size. Future research should use a larger sample, so that statistical testing could be employed. To conclude, structural convergence is an important aspect of L2 interaction. Given its potential benefits to L2 production accuracy, more research on structural convergence in naturalistic classroom contexts is needed in order to provide further information that can be applied to L2 teaching and learning.

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Appendix 1. Topic prompts

Instruction

- Discuss one of the following problems with your partner
- Together, try to find two possible solutions that could work. You can think of other solutions than the ones which are mentioned here. Make sure you can justify (give reasons for the solutions you choose).
- You will have seven minutes for discussion

1. Grading fairness

Many learners believe that grading at university can be unfair and can change from course to course. Some instructors believe that they need to have freedom and independence in grading learners so that learners get the most accurate grade. What can be done to solve these problems with grading?

2. Scholarships and obligations for international learners

In some countries, some scholarships come with certain conditions, especially for international graduate learners. The learner promises to graduate, then to return to work in his or her country for the same number of years that he or she studied (study 4 years, work 4 years) or even longer. If the learner breaks the promise he or she must return all the scholarship money. The countries want to make sure that if learners are given money to study internationally, the learners will come back to help the country with their new expertise. However, some learners feel trapped by these types of scholarships because after they graduate, they have no choice but to return to their countries. How could international scholarships be changed to allow more freedom for learners? Should these scholarships be changed?

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3. University dropout

Some undergraduate learners do well at university, but other learners have a very difficult time. Maybe they are not ready for university, or maybe they are not good enough in academic areas. What can be done to solve the problem of undergraduate learners struggling at university?

4. Unequal opportunities

Canada has a problem. Many young people who come from poor families are not getting good educations or good jobs. These young people sometimes drop out of school and do not get good training for jobs. They often need financial help from the government and are in poor health.

Primary and secondary education is free in Canada. However, some poor learners work many hours at apart-time jobs during secondary school, and so their grades are not high enough to enter posts-secondary education. In addition, postsecondary education (colleges, universities, and other institutions) requires tuition fees. Many poor learners do not have enough money to pay tuition and their parents do not have enough money either. The learners could get financial loans, but they would need to pay back the loan as well as interest payments after graduation.

Educational achievement and therefore future job opportunities are generally lower of learners from poor families. What can be done to solve the problem of unequal opportunities for these learners?

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Appendix 2. Examples of primes and targets

Constructions	Examples of structural convergence
Infinitive structure	<p>SA: ...Maybe they think <i>it's better for them to uh establish</i> barriers in some other countries</p> <p>SB: Maybe <i>it's better to make some new opportunities for the persons</i> who uh study abroad.... maybe better salary...</p>
That-complement	<p>SA: Ok <i>but I wonder this is a good solution?</i> ...</p> <p>SB: Ok,...<i>do you think this is this is a good solution?</i></p> <p>SA: <i>I think it's a good solution...</i></p> <p>SB: <i>I don't think that should be change.</i></p>
Relative clauses	<p>SA: ...to serve in British Petroleum for double <i>period that you spend out...</i></p> <p>SB: but I think uh some of <i>the solutions that uh cannot be uh limited...</i></p>
Adverbial clauses	<p>SA:so, <i>if they decide to more opportunity, they have also to return something to the, to the government</i> that pay for their ...</p> <p>SB: uh huh so, you mean that <i>if the learner wishes to go back to their own country, they have to pay 70 percent of the scholarship?</i></p>
Passive voice	<p>SA...so we are agree on three points that more supervision <i>must be given to the learners...</i></p> <p>SB: ... there's no research, there's no learning... <i>be given to the learners</i>, so but with that experience, the working experience, you have, because I work like eight years...</p>

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SA: ...so we are agree on three points that more supervision ***must be given to the learners...***

Existential
There SB: ...***there is an entrance exam*** for getting into the university, so only talented learners can get their way to the post secondary education or...

SA: ...University degrees, yeah. ***There is one universal exam*** around the country.

Make + noun
+ adjective SB: ...and ***make the undergraduate course easier***. I think it's very wrong because

SA: uh huh

SB: work materials and study material should be the same

SA:we didn't, if we makes, if we ***make the courses easier...***

Result clause:
So that SB: ...and uh ***give them a scholarship so that they can pay one year at maximum*** and they can ask scholarship from uh as graduate learner ...

SA: we have to assume the learner with the scholarship, ***they will find a good job here so that they can pay it back***, no problem
